INTERNATIONAL PRELIMINARY EXAMINATION REPORT (IPER) AMENDED CLAIMS

CLAIMS:

1. A **building cladding** to be applied to a cladding substrate, said building cladding having a cladding material of fusible material which is at least in part attached or attachable by fusing to fastenings, said fastenings at least penetrating said cladding substrate,

wherein by further fusion to itself said cladding material forms a generally continuous cladding membrane over said cladding substrate.

2. A building cladding as claimed in claim 1 wherein said fusion is by fusible welding such as thermal or ultrasonic welding.

3. A building cladding as claimed in claims 1 or 2 wherein said fastenings have a layer of material fusible to said cladding material on that surface which presents to said cladding material.

4. A building cladding as claimed in any one of claims 1 to 3 wherein said fusible material is a thermoplastic polyurethane.

5. A building cladding as claimed in either of claims 3 or 4 wherein said fastenings sit on top of said cladding and have said material fusible on their underside.

6. A building cladding as claimed in either of claims 3 or 4 wherein said fastenings sit intermediate said cladding material and said cladding substrate and have said material fusible on their top side.

7. A building cladding as claimed in either of claims 3 or 4 wherein said fastenings may sit within the structure of said cladding material, and have said material fusible on either their top and/or underside.

8. A building cladding as claimed in any one of claims 1 to 7 wherein said fastenings may join, by fusible welding, adjacent sheets of cladding membrane.

9. A building cladding as claimed in any one of claims 1 to 8 wherein said fastenings are of an elongate strip form.

10. A building cladding as claimed in any one of claims 1 to 8 wherein said fastenings are of a discrete or washer like form.

11. A building cladding as claimed in any one of claims 1 to 10 wherein said fastenings are of a rigid core with said fusible material coated there on.

12. A building cladding as claimed in any one of claims 1 to 10 wherein said fastenings are a singular material of fusibly weldable nature.

13. A building cladding as claimed in any one of claims 1 to 12 wherein said fastenings are penetratively fixed to at least said cladding substrate.

14. A building cladding as claimed in any one of claims 1 to 13 wherein said fastenings have provision for or can be associated with a penetrative fastener.

15. A **cladding membrane** for a building structure said cladding membrane having at least a first layer with an external major surface of a highly ultraviolet stable stabilised, heat or sonic fusible, thermoplastic polyurethane, said cladding membrane fusible to itself to form at least an in part continuous weather proof cladding for said building structure.

16. A cladding membrane as claimed in claim 15 wherein said thermoplastic polyurethane has a secondary lamination to its internal major surface of one of the following:

xii) Acrylonitrile – Butadiene – Styrene ("ABS"), or

xiii) Aluminium foil/or sheet, or

xiv) Aluminium mesh (or expandable aluminium), or

xv) Polypropylene ("PP"), or

xvi) Polycarbonate ("PC"), or

xvii) Polyethylene ("PE"), or

xviii) Thermoplastic polyurethane ("TPU"), or

xix) Natural fibre or cloth (e.g. jute or cotton), or

xx) Man made fibre (e.g. PP, polyethylene tetraphthalate ("PET"), or PE, in woven, non-woven, melt blown or filament form)

xxi) a plastics material, or

xxii) a metal material.

17. A cladding membrane as claimed in claim 16 wherein said cladding membrane may have a further tertiary lamination to the underside of said secondary lamination of one of the following:

xii) Thermoplastic polyurethane ("TPU"), or

xiii) Acrylonitrile – Butadiene – Styrene ("ABS"), or

xiv) Polypropylene ("PP"), or

xv) Polycarbonate ("PC"), or

xvi) Polyethylene ("PE"), or

xvii) Polyethylene tetraphthalate ("PET"), or

xviii) Ethylene Propylene Diene Monomer ("EPDM"), or

xix) Ethyl Vinyl Acetate ("EVA"), or

xx) Thermoplastic Rubber ("TPR")

xxi) a plastics material, or

xxii) a metallic material.

18. A cladding membrane as claimed in either of claims 16 or 17 wherein, where there is a secondary and tertiary layer, the secondary layer lies between said first layer and said tertiary layer.

19. A cladding membrane as claimed in any one of claims 16 to 18 wherein said secondary layer is encapsulated by said first and tertiary layers.

20. A cladding system as claimed in any one of claims 16 to 19 wherein there is a fourth layer on the outside major surface of said tertiary layer which consists of an adhesive or adherable material.

21. A **method of providing at least part of a building envelope** with a weatherproof membrane, said method comprising or including the steps of,

i) providing an array of fixing members, attaching into part of the structure of said building envelope,

ii) prior to and/or subsequent to the attaching of at least some, if not all, of said array of fixing members, locating a membrane onto said structure, to define a weather resistant surface, whether or not said membrane is of a single composition, fabricated as a laminate structure or otherwise, and

selectively fusing material(s) of said membrane and material(s), at least in part, of said array of fixing members to each other by application, in situ, of ultrasound or heat or other method causing, at least in part, fusion of said membrane to some or all of said fixing members.

22. A **method of providing at least part of a weather resistant building envelope** said method comprising or including, in any suitable order,

providing an array of fixing members (composite or otherwise), attaching into part of the structure of a building envelope,

locating a membrane suitable to make part of said structure weather resistant, and fusing materials(s) of both,

(i) said membrane, and

(ii) part of at least some of said fixing members,

to each or one another by application, in situ, or ultrasound, or heat and/or other energy input.

23. A method of rendering at least part of a building envelope as claimed in claim 22 wherein said membrane may be fused to itself to form a join or fold to itself or adjacent membranes.

24. A method of rendering at least part of a building envelope as claimed in claims 22 or 23 wherein there is also an array of adjacent sheets of material joined by fusible welding.

25. A method as claimed in any one of claims 22 to 24 wherein said membrane includes at least in part a thermoplastic polyurethane.

26. A method as claimed in claim 25 wherein said membrane is not itself coated, but it is rendered resistant to ultraviolet radiation if required.

27. A method as claimed in any one of claims 22 to 26 wherein said the array of fixing members is pre-attached to said structure of the envelope prior to over lying thereof with the membrane and subsequent fusing said fixing members to said membrane.

28. A method as claimed in any one of claims 22 to 26 wherein the attaching of the array of fixing members involves a penetration of the already laid

membrane and subsequent attaching to said structure, and fusible welding of said fixing members to said membrane.

29. A **fixing member** to provide an array for fastening a cladding membrane to a cladding substrate which comprises or includes provision of a member of substantially planar form with at least a layer of thermoplastic polyurethane on that surface to be fusibly associated with said cladding membrane, having at least one penetrative fastening protruding from its under side for penetrative association with a building substrate or structure.

30. A fixing member as claimed in claim 29 where said fixing member is a discrete "washer style" planar forms with one penetrative fastening there on.

31. A fixing member as claimed in claims 29 or 30 wherein said fixing member is circular in plan form.

32. A fixing member as claimed in claim 29 or 30 wherein said fixing member is of a many sided polygonal shape in plan form.

33. A fixing member as claimed in claim 29 wherein said fixing members are elongate "strip style" planar forms having a multitude of penetrative fastenings arranged along their length.

34. A fixing member as claimed in claim 33 wherein there is a ridge running along the length of said elongate planar form to form a T joint, whether inverted or otherwise, between abutting sheets of cladding membrane.

35. A fixing member as claimed in either of claims 33 or 34 wherein in cross-section said fixing member may have a cap like portion extending outwards from an upright to provide a cap that abutting sheets of said cladding membrane may at least in part lie under to form a join and/or fastening down of said cladding membrane.

36. A fixing member as claimed in claim 35 wherein said cap may be one sided to receive only one sheet of said cladding membrane.

37. A fixing member as claimed in claims 35 or 36 wherein said cap is two sided to receive two sheets, one either side of said upright, of said cladding membrane.

38. A fixing member as claimed in any one of claims 29 to 37 wherein said fixing members may lie on top of said laid cladding membrane, penetrating said membrane and fastening down to said building substrate.

39. A fixing member as claimed in any one of claims 29 to 37 wherein said fixing member may lie underneath said cladding membrane before said membrane is laid.

40. A fixing member as claimed in any one of claims 29 to 39 wherein said fixing member is fastened in place (either above or below said cladding membrane) and said cladding membrane is laid, the fixing member and membrane are at least in part fusibly welded to each other to at least fasten said membrane down.

41. A fixing member as claimed in any one of claims 29 to 38 wherein said fixing member is above said cladding membrane, said fusible welding also seals at least in part underside periphery of said fixing member to said cladding membrane.

42. A fixing member as claimed in any one of claims 29 to 38 wherein said fixing member has at least in part a lining of fusibly weldable material on its under side when fastening said cladding membrane from above, to fusibly weld to the fusibly weldable upper layer of the cladding membrane.

43. A fixing member as claimed in any one of claims 29 to 42 wherein said fixing member has at least in part a lining of fusibly weldable material on its upper side when fastening said cladding membrane from below, to fusibly weld to the fusibly weldable material lower layer of the cladding member.

44. A fixing member as claimed in any one of claims 29 to 43 wherein said fusibly weldable material on said fixing members is a thermoplastic polyurethane.

45. A fixing member as claimed in any one of claims 29 to 44 wherein said fusibly weldable material on said cladding membrane is a thermoplastic polyurethane.

46. A fixing member as claimed in any one of claims 29 to 45 wherein said fixing members have a core of material, with said thermoplastic polyurethane laminated there over.

47. A fixing member as claimed in any one of claims 29 to 45 wherein said fixing member may consist only of said thermoplastic polyurethane.

48. A fixing member as claimed in any one of claims 29 to 46 wherein said penetrative fastening is fixed to or passes through said core.

49. A fixing member as claimed in any one of claims 29 to 48 wherein said fixing member presents a sealed or sealable upper surface.

50. A fixing member as claimed in any one of claims 29 to 49 wherein a further sealing member may be added to or over said fixing member so that when said fixing member is fusibly welded to said cladding membrane a weather and element proof upper surface is presented.

51. A fixing member as claimed in any one of claims 29 to 50 wherein said member may be used in corners, on slopes and/or for cladding ridgelines, changes in shape and/or curvature to fasten and/or seal abutting or continuous cladding membranes.

52. A **structure** rendered at least in part waterproof by the use of a method in accordance with the present invention.

53. **In combination,** a plurality of said fixing members and a membrane compatible therewith so as to be complimentary therewith if used in a method in accordance with the present invention.

54. A **roof, wall or other region of a building envelope** rendered weather resistant by use of a membrane of any of the kinds herein exemplified where such membrane is held in place by localised association with each of an array of fixing members,

wherein said association optionally includes moulding or fusing of a thermoplastic polyurethane with a complimentary material forming at least part of each said fixing members.

55. A **fixing member** suitable for use in a method in accordance with the present invention.

56. A **building** with a weatherproof membrane applied to the structure of the building, the weatherproof membrane having been applied by a method as claimed in any one of claims 21 to 28 with reference to any one or more of the accompanying drawings.

57. **In combination**, multiple penetrative fasteners at least in part attached through or on a fixing member wherein said fasteners are fastened or fastenable to a building structure, and a membrane to clad said building structure whereby the fixing members, fastened or fastenable to the building structure, as in array can support the membrane by fusing between said fixing members and said membrane to retain said membrane to said building structure to provide a weatherproof membrane for said building structure.

58. A **cladding assembly** comprising or including

a substrate (clad or otherwise)of a structure,

a plurality of fixing members attaching into said structure, and

a membrane supported on said structure by said fixing members,

wherein said fixing members have not been or have been driven penetratively through said membrane

and wherein there has been a fusion or other association of at least part of the membrane material(s) with at least part of the fixing members, or at least some of them, as a consequence of energy supplied through the membrane,

59. A cladding assembly as claimed in claim 58 wherein said energy has been applied as ultrasound.

60. A cladding assembly as claimed in claim 58 wherein said energy has been applied as heat.

61. A **weather resistant building envelope** wherein the weather resistance has been bestowed by a method as claimed in any one of claims 21 to 28.

62. **In combination**, an ultrasonic device, and

a membrane, said device and said membrane being suitable for use in a method as claimed in any one of claims 21 to 28.